

Geothermal Potential is Used For Alumina Production in West Kalimantan

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Keywords: *Alumina Smelter, geothermal potential, Enhanced(or engineered) Geothermal Systems, West Kalimantan.*

ABSTRACT

Indonesia is a biggest producer of bauxite in the world. In 2011, an average of 40 million tonnes of bauxite are exported to China and Japan. But, it's still a raw material who has low economic's value than final material products.

So, bauxite must be treated by Bayer Process to get alumina. Then, alumina is changed to be aluminium by Hall-Heroult Process. The lack of funds still become a reason of government to not build a alumina's smelter yet. And then, energy resource is consumed for alumina's smelter can be major problem. Actually, the lack of power supplies in around bauxite mining area can be solved. For example in West Kalimantan, a power supplies problem can be solved by building a PLTP (Pembangkit Listrik Tenaga Panas Bumi). This solution is exactly because operating costs more cheaper and good environment in West Kalimantan. Where West Kalimantan is one of bigger produced of bauxite region after Bintan Islands. So, alumina is produced efficiently because of same area between PLTP and bauxite mining region.

According PT Alcoa Mineral Indonesia investigations that found out 800 tonnes of bauxite reserved in West Kalimantan in 1974. Geothermal Potency is pretty much even though it is not produce high power in West Kalimantan. In 2006, it's found five point locations by Department of Mining and Energy in West Kalimantan. And it produced electric power about 12,5 MW.

This is followed by related institution so that utilization of geothermal energy to generate electric power for alumina smelter

INTRODUCTION

Indonesia is a country rich in materials that are as abundant mining. Unfortunately, it is not matched by efficient management so people's welfare is not reached. Therefore, it takes the right solution to solve these problems. West Kalimantan is an area rich of mining materials have not been maximum exploited by the government. It is bauxite, aluminum ore is so large spread in ten areas of West Kalimantan, according to an insentive investigation by Alcoa Minerals Indonesia Company 1974. The central and local government and national company such as Aneka Tambang Company is trying to get the energy resources who efficient and effective in the treatment process so that the resulting alumina has a high quality and cheap for processed into pure aluminum in the country. In addition, the wealth of material mining. West Kalimantan is also very rich the energy resources. Geothermal energy is one of them environmentally friendly to supply electric power to the mining activities. Geothermal is energy

extracted from the heat stored in the earth. This energy uses water vapor heating by magma to drive turbines in order to not produce exhaust gases in the form of CO. There are five areas in West Kalimantan which has potential geothermal according to Geothermal Preliminary investigations by the Department of Mines and Energy of West Kalimantan in 2006. Pertamina Geothermal Energy as a company national geothermal energy should be included in the partnership to make the alumina smelter. Alumina is obtained from the Bayer process has a high selling price compared to the ore, which bauksit. bauksit obtained from soil that contains alumina (Al₂O₃) of 55-65% alumina content is taken through the process Bayer. After it was pure, pure alumina is taken through to be pure aluminum content by Heroult Hall process. Alumina prices in the market has a value of 40 times more expensive than bauxite per ton so that the state would lose money when selling the value of mining products such as bauxite. And then selling 257 times more expensive aluminum than bauxite per ton. Therefore, the governments are encouraged to build alumina smelter in the country.

BAUXITE POTENTIAL IN WEST KALIMANTAN

Bauxite reserves in western Kalimantan is big enough. Amount of 803.450.300 tonnes of bauxite reserved are distributed in 12 regions West Kalimantan. They were researched by M. Nagabuchi to fill an asking from PT IMCO (Indonesia Mercantile Co Ltd) on 1943. Meiji Mining Co Ltd, C Itoh Ltd on 1961, and PT Alcoa Mineral Indonesia on 1974. Bauxite deposits found with the longitudinal direction of the northwest to southeast from Ketapang to Singkawang. It is documented according to a report by the Department of Mines and Energy west Kalimantan in 2008.

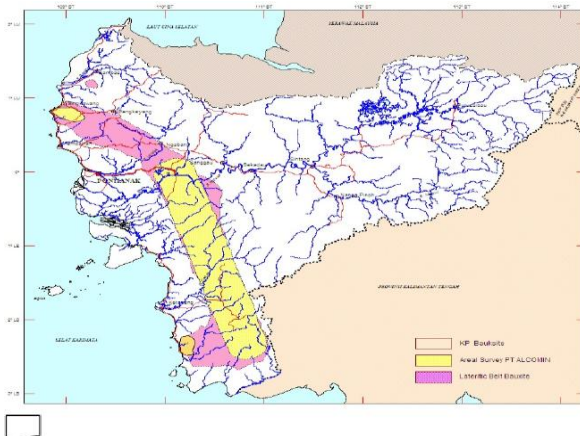


Figure 1: Distribution Map of Bauxite in West Kalimantan
Source: Adapted from West Kalimantan Minerals in 2008, the Department of Mines and Energy of West Kalimantan.

GEOHERMAL POTENTIAL IN WEST KALIMANTAN

Geothermal potential located in West Kalimantan is known of its natural heat system is a system of non-volcanic geothermal potential estimation can be seen in Figure 2.



Figure 2: Estimated Geothermal Potential in Indonesia
Source: Adapted from Current Status of Estimates and Classification of Geothermal Potential in Indonesia by Suryantini (INAGA), IGA Workshop on "Developing Best Practice for Geothermal Exploration and Resource / Reserve Classification" Essen, Germany, 14 November 2013

This is due to the activity of magma which is located beneath the layers land. It is continuously. It breaks into the top layer level of earth. This magma activity formed different formations that called magma intrusion. It is as heat source in the earth. Then, geothermal produced to heat the soil / aquifer who contained in the above formation of the magma intrusion so that produced steam to drive a turbine generator to produce electrical energy.

The electrical energy generated from geothermal energy in West Kalimantan is sufficient for the purposes to build alumina smelter. It is fact from result of Preliminary Investigation Geothermal Department of Mines and Energy of West Kalimantan in 2006, there are five points that have the potential geothermal locations to generate electric power on average 12.5 MW, although still speculative. Beside that, average electricity needs of the world in the process of manufacture of alumina from bauxite is 14,048 MJ. This means that the availability of a source of electrical energy in West Kalimantan for the production of alumina is sufficient in terms of energy by combining all of the electrical power that can be generated from five points of the geothermal potential.

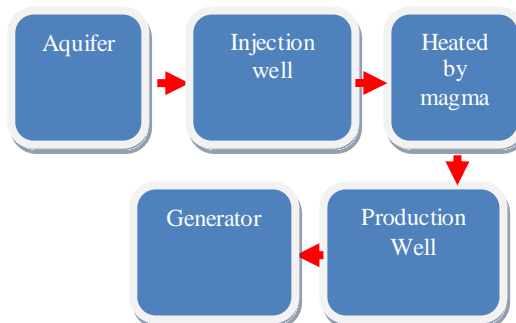
GEOHERMAL PRODUCTION PROCESS

Geothermal energy is derived from the magma, it is not necessarily immediately can be used practically to produce electric power. In manufacture Geothermal Power Plant (PLTP) in West Kalimantan used method Enhanced (or engineered) Geothermal Systems (EGS). Departemen Energy United defined EGS reservoir engineering as a ground to extract heat from low permeability (aquifers minimal amount). So, EGS method can be used in places that have groundwater levels in the aquifer layer is low and low rainfall too. In Indonesia, especially in West Kalimantan EGS method is used in order to supply water used in the process does not depend on the nature of geothermal power plants so that electricity production can continue to run even if rainfall is high enough

EGS Metode's used two types of wells for needing, Those are injection and production well. Injection well is a well used to inject water into the surface layer of magma intrusion in the bowels of the earth while the production well is a well that is used to produce water heating by

magma from bowels of the earth to the surface to be channeled into pipes go to the generator.

Water requirements in the operation of geothermal power plants is very important. The water are used in this EGS method's can be reused to perform the injection into the magma layer so that the environment is less than 10% of them usually evaporate into the atmosphere when they are in the earth surface. The figure shows the processes which has been described above.



SYNERGY OF THREE DOMESTIC COMPANIES TO DOWNSTREAM BAUXITE

Geothermal potential located in West Kalimantan must be optimal, not only local government, central government also have to hand it for many people's welfare. Geothermal power plant distributed in areas with high bauxite deposits should come first to build alumina smelter with a production capacity which is sufficient for domestic first. PT Antam as mining companies in the country that has been planning the construction of Smelter Grade Alumina (SGA) in Mempawah must be supported by central and local governments by providing funding incentives for its building. To provide a source of energy, PT Pertamina Geothermal Energy needs to help explore and develop geothermal power plants for the purpose of electrical energy sources alumina smelter. In its distribution from the location of geothermal electricity to smelters alumina, PT PLN also need help handle it. Three domestic companies must be cooperate for implementing Regulation of Energy and Mineral Resources (ESDM) No. 7 on 2012 about Minerals Added Value Through Activity Mineral Processing and purification.

This cooperation should be based into the three main aspects, namely the aspect of national needs, equitable distribution of production, and safety environment. A large demand will result in the form of finished or alumina smelter is a challenge that must be faced by government. Inalum company as the advanced smelter is one of alumina smelter requires thousands of tons of alumina are ready to be recycled into this aluminium. This time, Inalum still import alumina from Japan who still bauxite. Therefore, synergy on Aneka Tambang Company as stakeholders in the process of mining along with Pertamina geothermal Energy as exploiting geothermal and PLN Company as a manufacturer of electric energy, they can cooperate to implement the mandate of the Ministerial Regulation has been approved.

CONCLUSION

Geothermal as an energy resource who is environmentally friendly for alumina smelter is a new breakthrough for the mining industry, it is very abundant in Indonesia because Indonesia is located along the Ring of Fire lanes are very active plate movement and magma activity in the region, Although in the West Kalimantan region of the

passive plate is still possible to utilize the geothermal potential through the formation magma intrusion or system that is non-volcanic system.

Mutual synergy and prosperity of the people of between three (3) domestic companies. Those are PT Aneka Tambang, PT Pertamina Geothermal Energy and PT PLN are needed for the successful development of an alumina smelter who has already in production.

The target level of demand fulfillment consumer for aluminum industry in the country will fill step by step. It increases aluminum production capacity in the country because domestic demand is very high. Thus, the welfare of the people will be reached from alumina smelter development in Indonesia.

ACKNOWLEDGEMENTS

To the lecturers of Mining Engineering, Faculty of Engineering, State University of Padang are glad to assist authors material and information so that it can be solved paper writers in New Zealand Geothermal Workshop 2014

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